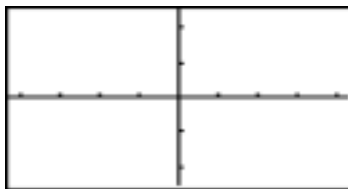


Inverse Trigonometric Functions

1. The Inverse Sine Function

Let $f(x) = \sin x$.

- a. Graph f on the interval $[-2\pi, 2\pi]$.



- b. Is $f(x) = \sin x$ a one-to-one function? _____ Why or why not? _____

Therefore, we must restrict the domain of f to make it one-to-one. We want to restrict the domain as close to the origin as possible. We restrict the domain of f to _____ to make it a one-to-one function.

- c. The inverse function of $f(x) = \sin x$ is $f^{-1}(x) = \sin^{-1} x$ (or sometimes written “arcsinx”). Sketch a graph of $f^{-1}(x) = \sin^{-1} x$ labelling the important values on the axes, and state the domain and range. Check your graph by graphing $y = \sin^{-1} x$ on your calculator.



Domain: _____

Range: _____ (This is important!)

2. The Inverse Cosine Function

Let $f(x) = \cos x$.

- a. Graph f on the interval $[-2\pi, 2\pi]$.



- b. Since $f(x) = \cos x$ is not a one-to-one function we must restrict the domain of f to make it one-to-one. Therefore, we restrict the domain of f to _____ to make it a one-to-one function.

- c. The inverse function of $f(x) = \cos x$ is $f^{-1}(x) = \cos^{-1} x$ (or sometimes written “arccosx”). Sketch a graph of $f^{-1}(x) = \cos^{-1} x$ labelling the important values on the axes, and state the domain and range. Check your graph by graphing $y = \cos^{-1} x$ on your calculator.



Domain: _____

Range: _____ (This is important!)

3. The Inverse Tangent Function

Let $f(x) = \tan x$.

- a. Graph f on the interval $[-2\pi, 2\pi]$.



- b. Since $f(x) = \tan x$ is not a one-to-one function we must restrict the domain of f to make it one-to-one. Therefore, we restrict the domain of f to _____ to make it a one-to-one function.

- c. The inverse function of $f(x) = \tan x$ is $f^{-1}(x) = \tan^{-1} x$ (or sometimes written “arctanx”). Sketch a graph of $f^{-1}(x) = \tan^{-1} x$ labeling the horizontal asymptotes, and state the domain and range. Check your graph by graphing $y = \tan^{-1} x$ on your calculator.



Domain: _____

Range: _____

4. Evaluate the following:

i. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

ii. $\cos^{-1}(-1)$

iii. $\sin^{-1}\left(\frac{-\sqrt{2}}{2}\right)$

iv. $\tan^{-1}(-\sqrt{3})$

v. $\cos\left(\cos^{-1}\left(-\frac{1}{2}\right)\right)$

vi. $\sin^{-1}\left(\sin\left(\frac{3\pi}{4}\right)\right)$ (Be careful!)

5. Use a right triangle to evaluate:

i. $\sin(\tan^{-1}(3))$

ii. $\cos(\sin^{-1} x)$

iii. $\csc(\tan^{-1} x)$